Center Independent Research & Development: GSFC IRAD

Micro-size Precision Timing Unit for CubeSat Applications

Completed Technology Project (2014 - 2015)

Project Introduction

We propose to design, develop, fabricate, and test a micro-size accurate timing unit that offers unprecedented frequency stability over a wide range of temperature. The proposed micro-size precision clocks will reduce thermal sensitivity and susceptibility to shock and acceleration. The new micro-size reference clocks will have wide applications for CubeSats and for NASA's future instruments that require miniaturized timing units.

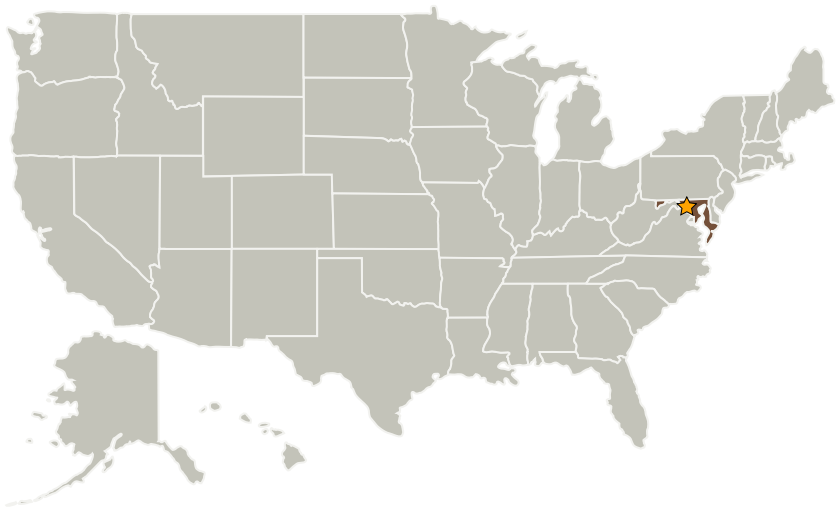
The timing units used for space applications are based on quartz crystal resonators, which have a small temperature coefficient of elasticity (TCE), large size and incompatibility with electronic fabrication processes. The micro-size timing unit will use MEMS fabricated silicon resonators replace the quartz crystal resonators to develop a better precision timing unit for space applications. The new precision timing unit will have a wide temperature range and lower susceptibility to shock and acceleration. It can be integrated into the electronics, which will reduce the size and lower cost for NASA's future instruments.

Anticipated Benefits

This project will benifit NASA's future CubSat and PicoSat projects

This project will benifit other government agencies that require miniaturized timing unit.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Co-Funding Partners	Type	Location
University of Michigan-Ann Arbor	Academia	Ann Arbor, Michigan

Primary U.S. Work Locations
Maryland

Stories

Si Time
(https://techport.nasa.gov/file/3487)

Project Website:

http://aetd.gsfc.nasa.gov

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Manager:

Terence A Doiron

Principal Investigator:

Yun Zheng

Co-Investigator:

Mina Rais-zadeh

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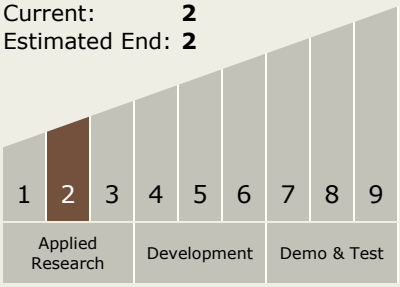
Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **2**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes